SWEDISH PATENT 427 053

FORMING WIRE

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The present invention concerns a forming wire for a machine used to make paper, tissue, nonwovens or the like by dewatering and forming a fibrous suspension. The wire comprises one or more layers of interlacing length (MD) and cross-direction (CD) yarns.

Certain types of fibrous sheets require a characteristic pattern to be formed in them. The pattern is obtained by creating dense and bulky areas of fibres in controlled regions. Patterned sheets of particular interest are those used in hospitals or as industrial fabrics. Normally these are referred to as nonwovens or tissue. For these applications the pattern confers the sheet with essential properties such as the ability to form multiple plies that can be easily compressed to expel air from between the plies via the bulky fibre regions. Frequently the nonwoven producer also requires a specific pattern in the product for aesthetic reasons too.

An object of the present invention is to provide a forming wire with a structure that forms a characteristic pattern of alternating dense and bulky regions in the dewatered fibrous web, which may also contain hollow regions.

Known methods for producing patterned sheets include dewatering with two wires, using a standard wire as the bottom forming wire, around which runs a coarse forming wire typically having a 2,3,4 or 5-shaft weave and a fineness of up to 10 CD yarns / cm, i.e. a maximum of 10 x 10 = 100 cross-over points per cm^2. The knuckles or floats in the coarse wire are used to emboss the sheet. However this method is complicated, expensive and offers only a limited embossing effect. The present invention simplifies the process by using just one wire to drain, form and emboss the sheet in a single step.

The invention is characterised by the wire having systematically distributed surface regions of suitable size (e.g. the same size), in which the MD and CD yarns create either no interlacings at all or create substantially fewer interlacings compared with the weave structure in the rest of the fabric.

An example of the invention will now be shown by way of drawings.

Fig. 1 shows a cross-section through a wire according to the invention in the length direction.

Figure 2 shows a weave pattern.

The wire is woven to a fine structure typical for these types of sheet formation applications, i.e. at least 400 cross-over points per cm^2. Normally a so-called tissue wire will contain ca. 800 - 1000 cross-over points per cm^2 if it has a single-layer structure, or 1800 - 3000 cross-over points per cm^2 if it has a double layer structure. The wire according to the invention may have a single-layer MD and CD yarn system, or it can contain more than one layer in either of the MD or CD yarn systems.

② 4

In fig. 1 an MD yarn (1) is interwoven with CD yarns (2). Arrows (3) and (4) illustrate "hills" on the wire surface caused by raising the CD yarns relative to sheet support side of the wire. Region (3) is formed from one interlacing between an MD yarn floating under three CD yarns. Likewise a single interlacing is formed in region (4) between an MD yarn floating under five CD yarns.

The "hill" regions (3,4) can have the same size or have different sizes but they are always distributed in a systematic and regular manner over the wire surface to form a pattern corresponding to that which will be embossed in the sheet. In fig. 2 "hill" regions (6) each containing 3 x 3 = 9 interlacings are present in a wave pattern which repeats for every 15 MD yarns (8) and 15 CD yarns (9). Between these "hill" regions are "valleys" (7) lying in a plane at least half the MD yarn diameter lower than the highest point of the "hill" regions.

The simplest way to form these embossing hills and valleys is to use different weave paths in the two respective regions.

A weave with a low frequency of interlacings is used in the "hill" regions, whilst a weave with a high frequency of interlacings is used in the "valley" regions. For example, in fig. 1 the MD yarns form no interlacings within the "hill" regions (3,4) whilst in between these regions it forms two interlacings for every two CD yarns, creating alternating dense and open fabric areas. Dewatering is greater in the open (raised) areas and less in the dense (lower) areas, therefore dewatering is concentrated in the "hill" regions where the sheet is thinner due to reduced retention of fibres.

It should be pointed out that the pattern is created by the different regions of fabric density and infact no height difference between the dense and open fabric areas is required. As a consequence the wire can also have different porosity and void volume values in these regions. High porosity regions result in greater dewatering and reduced fibre content in the formed sheet. For example, a pattern can be obtained using dense and open areas having porosity values of ca. 50% and 55 - 60 % respectively, without creating a biplanar sheet support surface in the wire.

CD yarns can also be raised relative to the sheet support by means of the yarn crimp or weaving techniques.

Claims

1). Forming wire for machines used to make paper, tissue, nonwovens or the like by dewatering and forming a fibre suspension, said wire comprising interwoven length and cross direction yarns present in one or more layers, characterised by the wire having systematically distributed surface regions (3,4,6) of suitable size (e.g. the same size), in which the number of interlacings between the length direction yarns (1) and cross direction yarns is equal to zero or a number substantially less than the number of interlacings in the woven structure in the rest of the fabric.

2.) Forming wire according to claim 1, characterised by the surface regions (3,4,6) being raised relative to the rest of the fabric on the fabric's sheet support side.

3.) Forming wire according to claim 2, characterised by the cross direction yarns (2) in the surface regions (3,4) lie at least half the yarn diameter above the rest of the fabric on the fabric's sheet support side.

4). Forming wire according to claim 1, characterised by the number of interlacing points in the surface regions being equal to zero.

5). Forming wire according to claims 1 - 4, characterised by more than one yarn system for the length and / or cross direction yarns.

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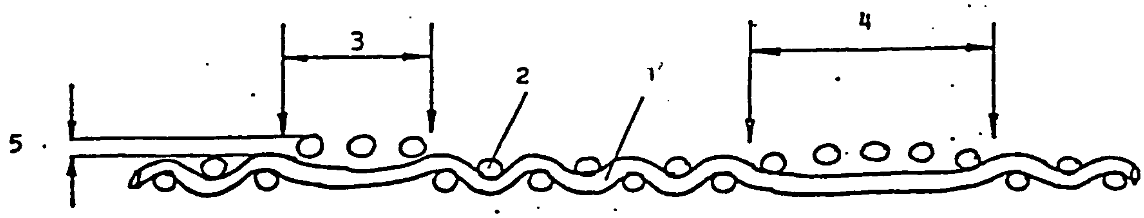
Figur 1



Figur 2